ECONOMIC BOTANY

Devoted to Applied Botany and Plant Utilization

Volume X
1956

Founded, managed, edited and published by
EDMUND H. FULLING
at
The New York Botanical Garden

Advisory Editors

DR. RALPH HOLT CHENEY
Brooklyn College

DR. ALBERT F. HILL
Harvard University

DR. WILLIAM J. ROBBINS
The New York Botanical Garden

DR. W. H. HODGE
Longwood Gardens

Published Quarterly
Printed at 111 East Chestnut Street
Lancaster, Pa.

CONTENTS

Mbocayá or Paraguay Cocopalm—An Important Source of Oil 3
The Seminole Pumpkin 33
Influence of Enzymes on the Quality of Processed Vegetables and Fruits 38
Chinese Herbal Medicine—Recent Studies 42
Chinese Water Chestnut or Matai—A Paddy Crop of China 49
Economics of the Lemon Industry . 66
Bryophytes as Economic Plants ... 75
Macadamia Nut Production in the Hawaiian Islands 92
Jute—World's Foremost Bast Fibre. I. Botany, Agronomy, Diseases and Pests 103
The Mexican Candelilla Plant and Its Wax 134
The Culture of False Hellebore ... 155
Alkaloid Yields of *Veratrum fimbriatum* as Influenced by Site, Season and Other Factors 166
Apple Storage in Northern Greece .. 174
Papermaking Fibers 176
Collection, Preservation and Utilization of Indigenous Strains of Maize 194
Jute—World's Foremost Bast Fibre. II. Technology, Marketing, Production and Utilization 203
Kava—Polynesian Beverage Shrub 241
Origin and Taxonomy of Broccoli .. 250
Constituents of *Crotalaria spectabilis* Roth 254
Phytochemical Examination of the Leaves of *Carica papaya* L. 258
A New Approach to Studies on Fungi 261
Sage as a Condiment in the Graeco-Roman Era 263
Extraction and Utilization of Carotenes and Xanthophylls 267
West Indian Cherry—Richest Known Source of Natural Vitamin C 280
Federal Plant Introduction—A Review 299
Bamboo in the Economy of Oriental Peoples 335
Yerba de la Fleche—Arrow and Fish Poison of the American Southwest 362
Utilization of Lichens in the Arctic and Subarctic 367

Utilization Abstracts

Rauwolfia 173
Quercetin 173
Cattails 193
Essential Oils 193
Otto of Roses 193
Spices and Essential Oils as Preservatives 257
Myocaya Palm 266
Seaweed Colloids 334

Book Reviews

Indian Corn in Old America 32
Garden Spice and Wild Pot-Herbs .. 91

THE FIRST DECADE

Articles and Abstracts in Economic Botany, Volumes 1–10

ARTICLES

Vol. I, 1947

Why Another Botanical Magazine? 3
Hybrid Corn—Science in Practice 5
Manioc—A Tropical Staff of Life 20
The Cork Oak Tree in California 26
Minor Fiber Industries 47
The Distribution, Abundance and Uses of Wild Drug Plants in Oregon and Southern California 57
Seaweed Resources of North America and Their Utilization 69
Cell Walls and Synthetic Fibers 98
The Plant Resources of Peru 119
The Versatile Soybean 137
The Production of Minor Essential Oils in the United States 148
Tung Oil—A Gift of China 161
Chemical Control of Plant Growth 176
The Role of Botanical Research in the Chicle Industry 188
Plantation Rubber in the New World 210
Effects of Manuring on Growth and Alkaloid Content of Medicinal Plants 230
The Biology and Economics of the Beverage Industry 243
Taro—With Special Reference to Its Culture and Uses in Hawaii 276
Veneers and Plywood—Their Manufacture and Use 290
Henbane—Healing Herb of Hercules and of Apollo ..... 306[1]
Agar—A Pre-War Japanese Monopoly ... 317
Cinchona Plantation in the New World .. 330
Kenaf—Fiber-Plant Rival of Jute 334
Sorghum—Its Production, Utilization and Breeding 355
Ergot—A Blessing and a Scourge 372
The Culture of Cork Oak in Spain 381
Edible Nuts of the Pacific Northwest 389
Red Squill—Most Specific of the Raticides 394
Botanical Drugs—A Brief Review of the Industry with Comments on Recent Developments 402
Citrus Products—A Quarter Century of Amazing Progress ..... 415[2]
Lonchocarpus—A Fish-Poison Insecticide .. 427
Some Promising Insecticidal Plants 437
Use of Synthetic Hormones as Weed Killers in Tropical Agriculture 446

Vol. II, 1948

Economic Botany—A Modern Concept of Its Scope 3
Economic Uses of Lichens 15
Tagua or Vegetable Ivory—A Forest Product of Ecuador ..... 46[3]
Plants for Special Uses 58
Curare and Modern Medicine 73
Sweetpotatoes—World Production and Food Value 83
Pectin—Its Extraction and Utilization ... 88
Temperate-Zone Plants in the Tropics ... 92
Plant-Breeding Methods and Current Problems in Developing Improved Varieties of Tomatoes ..... 100[4]
Fifty Years of Quantitative Microscopy in Pharmacognosy 111
The Coconut Palm—Mankind's Greatest Provider in the Tropics 119
Commercial Production of Acids by Fungi 145
Hemp—Production and Utilization 158
A Troublesome Mold and Its Control in Gas-Purifying Sponge 170
Plants Useful for Bee Pasture 178
Rubber—The Primary Sources for American Production 198
Wartime Cinchona Procurement in Latin America 229
Coffee Breeding in Java 258
The Castor-Oil Plant in the United States 273
Forest-Tree Breeding 284
The Common Guava—A Neglected Fruit with a Promising Future 306
Growing Better Tobacco 326
The Olive Industry of California 341
Seaweed Resources Along the Shores of Great Britain 363
The Origin of the Cultivated Tomato ... 379
Cork and Cork Products 393
Figs—Facts and Figures of 1948 403
Lignin—A Botanical Raw Material 419
Datura Innoxia—A Potential Commercial Source of Scopolamine 436

[1] See also Vol. II, p. 110.
[2] See also Vol. II, p. 187.
[3] See also Vol. II, p. 197.
[4] See also Vol. III, p. 330.

Vol. III, 1949

The Water-Soluble Gums—Their Botany, Sources and Utilization 3
Turkish or Oriental Tobacco 32
Coir Dust or Cocopeat—A Byproduct of the Coconut 42
Grapes and Wine 46
Essential Oils—A Brief Survey of Their Chemistry and Production in the United States 71
The Importance of Plant Classification in Hevea 84
Roselle—A Potentially Important Plant Fiber 89
A Chemurgic Survey of the Desert Flora in the American Southwest 111
Production, in Venezuela, of Indigenous Varieties of Tobacco 132
The "Palo de Tomate" or Tree Tomato 140
Safflower 143
Cinchona Cultivation in Guatemala—A Brief Historical Review up to 1943 150
The American Peanut Industry 158
Production and Utilization of Alfalfa 170
Microbial Farming 184
Watermelon Breeding 193
Milkweed—A War Strategic Material and a Potential Industrial Crop for Sub-marginal Lands in the United States 223
Manicoba and Mangabeira Rubbers 240
World Production and Consumption of Millet and Sorghum 265
Plant Growth-Regulators 289
Forest-Tree Genetics Research—*Populus* L. 299
History, Taxonomy and Culture of the Pineapple 335
Mycological Production of Citric Acid—the Submerged Culture Method 360
Research on the Improvement of Turpentine Practices 375
Fiber Flax in Oregon 395
The Essential Oil of *Pectis papposa* 407
Problems Associated with the Procurement of Plant Products from the American Tropics 413
Irish Moss—A Seaweed that Supports an Industry 428

Vol. IV, 1950

Some Potential Sources of Important Plant Products in California 3
Maté—South American or Paraguay Tea . 37
The Taxonomy, Genetics, Production and Uses of the Cultivated Species of *Cucurbita* 52
Flight from Reality 85
The Taxonomy, Harvesting, Processing and Utilization of Eucalyptus Trees in Australia 99
Bulrushes and Their Multiple Uses 132
Domestic Production of the Essential Oils of Peppermint and Spearmint 139
Sugar-Cane—As Seen from Hawaii 150
Diseases of Fruits and Vegetables Found on the Market, and Means of Controlling Them 177
Papain—The Valuable Latex of a Delicious Tropical Fruit 192
The Natural Hard Resins—Their Botany, Sources and Utilization 203
Brush-Making Fibres 243
The Avocado—A Gift from the Middle Americas 253
The Origin and History of Pop Corn 294
Age-Old Resins of the Mediterranean Region and Their Uses 307
Alginates in Drugs and Cosmetics 317
Citronella Oil 322
Leucaena—A Promising Soil-Erosion-Control Plant 337
Comparison of Seed and Vegetative Propagation Methods for Red Squill 350
Peanuts—Especially Their Diseases 354

Vol. V, 1951

The Principal Chinese Vegetable Foods and Food Plants of Chinatown Markets 3
Minor Oil-Producing Crops of the United States 38
Carbohydrate Sources for Ethyl Alcohol Production 60
Carob or St. John's Bread 82
Balsa—Production and Utilization 107
Microbiological Production of Enzymes and Their Industrial Applications 126
Coca—The Mainstay of an Arduous Native Life in the Andes 145
The Potato—Its Origin, Cytogenetic Relationships, Production, Uses and Food Value 153
Phormium Tenax—New Zealand's Native Hard Fiber 172
Three Native Tuber Foods of the High Andes 185
The Pollen Harvest 211
Guayule—An American Source of Rubber 255
The Date Palm—"Tree of Life" in the Subtropical Deserts 274
Sweet Corn—Mutant or Historic Species .. 302

War-time Rubber Exploitation in Tropical America 311
Small Grains for Starch Production 338
Production and Utilization of Sugar Beets 348
Canaigre—A Desert Source of Tannin ... 367
The Sweet Potato—Its Origin and Primitive Storage Practices 378
Hybrid Vigor in Cotton—Cytogenetic Aspects and Practical Applications 387

Vol. VI, 1952

The Duboisias of Australia 3
Some Observations on the Cultivation of Kenaf 18
Supplementary and Emergency Food Plants of West Africa 23
Simmondsia or Jojoba—A Problem in Economic Botany 41
Propagation of Strophanthus 48
Land Development and Large Scale Food Production in East Africa by the Overseas Food Corporation 55
Breeding Tobacco for Disease Resistance .. 69
Wild Rice—Indian Food and a Modern Delicacy 107
Sugar-Cane Breeding in Java 143
The Tobacco Industry in Australia 151
Hops—Their Botany, History, Production and Utilization 160
Breeding Winter Barley for Hardiness and Disease Resistance 176
Microbial Synthesis of Riboflavin 185
Root Starches Other than Those of White and Sweet Potato 211
Adlay or Job's Tears—A Cereal of Potentially Greater Economic Importance ... 216
Grapefruit and Pummelo 228
Citrus in West Africa, with Special Reference to Liberia 246
The Use of Wild Plants in Tropical South America 252
Breeding and Establishing New Trees Resistant to Disease 271
Plant Disease Control with Antibiotics ... 294
Plant Breeding and the Vegetable Industry 315
Indian Podophyllum 342
Recent Developments in Essential Oil Production 355
Carnauba Wax—Product of a Brazilian Palm 379
Antibacterial Substances from Lichens ... 402

Vol. VII, 1953

Barley—Botany, Production, Harvesting, Processing, Utilization and Economics .. 3
The Role of Fungi in Cheese Ripening ... 27
Production, Harvesting, Processing, Utilization and Economic Importance of Oats 43
The Development of Domestic Castor Bean Production 65
Production and Utilization of White Potato Starch 76
Philippine Rubber Plantations 86
Ammi Visnaga Lam.—A Medicinal Plant 89
The Drug Aloes of Commerce, with Special Reference to the Cape Species 99
The Mango—Its Botany, Cultivation, Uses and Future Improvement, Especially as Observed in India 130
Broomcorn—The Frontiersman's Cash Crop 163
The Relation of Plants to Public Health .. 182
The Abacá Plant and Its Fiber, Manila Hemp 195
The Cultivated Capsicum Peppers 214
Chinese Chestnut—A Promising New Orchard Crop 228
Contributions of Applied Science to the Lettuce Industry of the Southwest 243
Natural Crossing in Cotton 257
A Pharmacognostic Study of *Piscidia Erythrina* 270
Vanilla—Its Botany, History, Cultivation and Economic Import 291
American Witch Hazel—History, Nomenclature and Modern Utilization 359
A Genic Substitute for Isolation in Hybrid Corn Seed Production 382

Vol. VIII, 1954

Useful Native Plants in the American Southwestern Deserts 3
Effect of Temperature and Duration of Storage on Quality of Stored Sweet-potatoes 21
Pectin—A Product of Citrus Waste 29
Principles and Practice of Mushroom Culture 48
Industrial Production and Utilization of Enzymes from Flowering Plants 99

Kaivun Fibre 114
Some Unit Processes and Unit Operations in the Industrial Utilization of Agricultural Products 118
The Vanishing White Mulberry of Northern Greece 145
The Economic Plants of the Bible 152
A Note on Spartina Protein 164
The French Lavender and Lavandin Industry 166
The Chemistry of Brown Algae 174
The Edible Arracacha—A Little-known Root Crop of the Andes 195
Botanical Aspects of Oregano 222
Tree-Rings and History in the Western United States 234
Wheat Breeding and Our Food Supply ... 251
Stimulation of Pine Oleoresin Flow by Fungal Inoculation 269
Isolation and Utilization of Vegetable Proteins 291
The Essential Oil Industry of Australia .. 316
The Natural Origins of Some Popular Varieties of Fruit 337
Rauvolfia serpentina—Its History, Botany and Medical Use 349
Indian Aconites 366
Flavor Qualities of Some Edible Oriental Bamboos 377

Vol. IX, 1955

Chlorophyll Derivatives—Their Chemistry, Commercial Preparation and Uses 3
Caranday—A Source of Palm Wax 39
Forest-Tree Genetics Research: *Quercus* L. 53
Dehydrated Alfalfa Prevents Scale in Sea Water Evaporators 72
Cultivation of Peppermint in Florida 78
Some New or Noteworthy Industrial Raw Materials of Plant Origin 99
Recovery and Utilization of Tree Extractives 108
Alkaloid Hunting 141
Jute—Especially as Produced in West Bengal 151
Poisonous Plants of Greece 175
The Story of Spices 190
Loofah—The Sponge Gourd 211
Pakistan Santonica 224
Olive-Growing in Greece 228
Propagation of Black Pepper 233
Toxicological Studies of Southeastern Plants. I. Leguminosae 243
Introducing Black Pepper into America .. 256
Reducing Capacity, Potentials and Water of Apples 269
Safflower—Production, Processing and Utilization 273
Preparation of Starch from *Amaranthus cruentus* Seed 300
The Search for Plant Precursors of Cortisone 307
Hard Fibres 376

Vol. X, 1956

Mbocayá or Paraguay Cocopalm—An Important Source of Oil 3
The Seminole Pumpkin 33
Influence of Enzymes on the Quality of Processed Vegetables and Fruits 38
Chinese Herbal Medicine—Recent Studies 42
Chinese Water Chestnut or Matai—A Paddy Crop of China 49
Economics of the Lemon Industry 66
Bryophytes as Economic Plants 75
Macadamia Nut Production in the Hawaiian Islands 92
Jute—World's Foremost Bast Fibre. I. Botany, Agronomy, Diseases and Pests .. 103
The Mexican Candelilla Plant and Its Wax 134
The Culture of False Hellebore 155
Alkaloid Yields of *Veratrum fimbriatum* as Influenced by Site, Season and Other Factors 166
Apple Storage in Northern Greece 174
Papermaking Fibres 176
Collection, Preservation and Utilization of Indigenous Strains of Maize 194
Jute—World's Foremost Bast Fibre. II. Technology, Marketing, Production and Utilization 203
Kava—Polynesian Beverage Shrub 241
Origin and Taxonomy of Broccoli 250
Constituents of *Crotalaria spectabilis* Roth 254
Phytochemical Examination of the Leaves of *Carica papaya* L. 258
A New Approach to Studies on Fungi 261
Sage as a Condiment in the Graeco-Roman Era 263
Extraction and Utilization of Carotenes and Xanthophylls 267
West Indian Cherry—Richest Known Source of Natural Vitamin C 280
Federal Plant Introduction—A Review ... 299
Bamboo in the Economy of Oriental Peoples 335
Yerba de la Flèche—Arrow and Fish Poison of the American Southwest 362
Utilization of Lichens in the Arctic and Subarctic 367

ABSTRACTS

Vol. I, 1947

More Antibiotics 25
Oil of Rue 25
Vegetable Oil Exports from Brazil 25
Mulberry Trees in Brazil 25
Barley 25
Medicinal Plants in Britain 46
Timbers in British Honduras 46
The Shelterbelt Project Pronounced a Success 113
Chemical Utilization of Wood 114
Sunflower Seeds 114
Medicinal Plants 115
Pre-harvest Fruit Drop 115
Peanuts 115
Shelterbelts in Russia 116
Castor Beans 116
Edible Andean Tubers 136
Cedar Oil 136
Tree Bark 147
Pineapples 160
Tonka Beans 175
2,4-D, a Selective Herbicide in the Tropics 175
Lycopodium Powder 175
Buckwheat, Rutin and Hypertension 187
Ragweed 187
Insecticide from Southern Pine Stumps .. 229
Vegetable Oils in Soaps 229
Charcoal 237
Peanut Oil 237
Hawaiian Food Plants 238
Forest Products of Ecuador 238
Origin of Cucurbits 239
Brazil Nuts 239
Japanese Mint 239
Fats and Proteins from Cucurbits 240
Soybeans 275
Sesame 289
Brazilian Timbers and Medicinals 289
Bamboo Pulp 316
Cork Oak in Maryland 316
Charcoal 316
Oiticica Oil 329
Tanning Materials 333
Spanish Essential Oils 350
Hemp 351
Wood Distillation 371
Sunflower Seed 388
Jojoba 401
Naranjilla 414
Tropical Plants as Sources of Pectin 426
Furfural 426
Bananas 436
Cork 445
Wooden Boats of Ecuador 460
Flax, Coir, Ramie, Henequen 460

Vol. II, 1948

Chemurgic Research in Florida 14
Curare 82
Bagasse 169
Rubber in Ceará 177
Wood Flour 217
Orris Root 217
Wattle in the U. S. 217
Asparagine and Glutamine 219
Vanilla on Dominica 219
Yawa 219
Economic Plants of Truk 219
Peanut Protein Fiber 221
Bamboo Pulp 222
Guar 223
Bamboo in Ecuador 223
Soybeans 224
Tree Rings 225
Essential Oils 227
Margarine 283
Plants and Plastics 333
Vanillin from Lignin 334
Natural Perfume Materials 334
Chlorophyll 362
Sugar from Wood 402
Corn Products 435

Vol. III, 1949

Soybeans 41
Margarine 45
Flax 70
Newsprint from Wheat Straw 83
Essential Oils 104
Cannery Residues 106
Peanuts in Africa 107
Jojoba 131
Yerba Maté 139
Chlorophyll 142
Drug Plants of Africa 149
Vegetable Oils of Venezuela 157
Pecan By-products 169
Hardwood Pulp 192
Chemurgic Utilization of Wood 213
Hyoscine and Hyoscyamine 215
Cocona 216
Cedarwood Oil 217
Wormwood 219
Cottonseed 219
Bamboo Paper Pulp 239
Bamboo Blowgun 239
Cortisone from Yams 288
Waxes and Fats from Sugarcane 331

Flax 359
Citrus Waste Oil 374
Rutin 394
Carob 406
Papaya 406
Rice Hulls 412
Tall Oil 427
Safflower 427
Herculin 427
Indigenous Food Plants of West Africa .. 436
Tropical Woods 444

Vol. IV, 1950

Panama Hats 81
Opium 82
Sisal 83
Straw Paper-Pulp 84
New Naval Stores Product 138
Nipa Palm 149
Lespedeza Oil 194
Food from Algae 194
Rice Bran Oil 194
Cashew Oil 194
Pine Tannin 194
Geranium Oil 242
Yaupon 293
Sericea 293
Bagasse 299
Kenaf 299
Vegetable Oils in Venezuela 300
Lemongrass Oil 304
Bark Wax 316
Origin of Corn Belt Maize 321
Cork Substitutes 336
Cortisone 353
Yuca 379
Ramie 380
Mannitol and Sorbitol 380
Maple Flavor Imitations 381
Synthetic Camphor, Menthol, Salicylic Acid 381
Carotene and Chlorophyll 382
Florida Fibers 383
Sumac Tannin 385

Vol. V, 1951

Ginger 59
Attar of Roses 81
Pine Breeding 96
Cortisone 97
Khus 171
South African Drugs 201
Root Beer 202
Filbert Enzymes 204
Inositol 204
Carvone, Limonene and Synthetic Spearmint 205
Soybean Paper 205
Poplar Breeding 205
Jute Substitute 205
Crin Vegetale 205
Legume Mucilages 254
Lemongrass Oil 301
New Perfume Plants 306
Australian Kelp 307
Broom Fiber 307
Hibiscus Fibers 307
California Essential Oils 307
African Peanut Scheme 307
Sugar-Cane Wax 307
Pandanus Oil 408
Central American Edible Plants 408

Vol. VI, 1952

Conifer Foliage Oils 17
Carnauba Substitutes 17
African Oil Palms in Honduras 22
Stillingia Oil 22
Antibiotics from Higher Plants 47
Riboflavin 54
May Rose 54
Rutin 68
White-Potato Starch 102
Drugs of Microbial Origin 159
Castor Oil 175
Sweet-Potato Starch 215
Kenaf in Florida 215
Diatoms 227
Furfural 245
Cortisone from Sisal Waste 245
Scabrin 251
Creosote Bush 270
Coconut Chips 270
Waxes 270
Domestic Essential Oils 341
Ash Baseball Bats 341
Sugar-Cane Bagasse 354
Witloof Chicory 354
Glucuronic Acid 378
California Lemons 378
Vicara 378
Soybeans 401
Earliest Banana Culture 401

Vol. VII, 1953

Violet Perfumes 42
Citrus By-Products of Florida 64
Cortisone from Yucca 75
Guayule 75
Akee 92
Fungal Enzymes 93
Food and Chemicals from Unicellular Algae 129
Tobacco Flavoring 162
Castor Oil 188
Useful Algae 188
Brazilian Tannins 189
India's Gur Industry 189
Essential Oils from Evergreen Trees 189
Chlorophyll in Dentifrices 190
Nova Scotia Seaweed Survey 190
Battery Separators and Plates 227
Dragon's Blood 227
New Jersey Tea 227
Corn Cobs 284
Lignum Vitae 284
Waxes 285
Wood Flour 358
British Guiana Woods 381
Bagasse Paper 381
Rice Bran Oil Wax 381
Osage Orange Antioxidant 381
Camphor 381

Vol. VIII, 1954

Tomato 20
Tannin from Waste Bark 28
Cassia 28
Industrial Raw Materials of Plant Origin. I and II 28
Hemlock 47
Chemicals from Oranges 47
Labrador Tea 47
Natural Candy Flavors 95
Oak Moss 95
Industrial Raw Materials of Plant Origin. III 113
Manioc in Africa 117
Ginseng 144
Tannic and Gallic Acids 151
Eucalypt Tannin 163
Industrial Raw Materials of Plant Origin. IV 165
Cananga and Ylang-Ylang Oils 192
Flower Oil Industry of Southern Italy 233
Hemlock Tannin 284
Tannin from North Borneo 285
Tannins of India 285
Acacia Tannin 285
Industrial Raw Materials of Plant Origin. V. A Survey of the Bamboos 285
Cunaigre Tannin 286
Luffa Gourd 286
Lime Oil 286
Indian Oilseeds 336
Indians' Berries 336
Pepper 348
Candlenut Oil 365
Cloves in Cigarettes 365
Bambara Groundnuts 376
Caesalpinia Tannin 376

Vol. IX, 1955

Shuttles and Bobbins 38
Lavender 52
Naringin 71
Huon Pine Wood Oil 71
African Oil Palm 77
American Desert Plants 93
Tannins and Resins in Drilling Muds 93
Flower Oil Industry of North Africa 140
Sesame 150
Tyrolean Conifer Oils 174
Peanuts 207
Algae as Food 207
Vegetable Sweets Native to the U.S.A. 242
Plant Materials and Human Fertility 255
Conifer Needle Oils 299
Vetiver 299
Sweetest Natural Substance 303
Soap Plants 303
Brazilian Vegetable Oils 304
Bahamian Medicine 304

Vol. X, 1956

Rauwolfia 173
Quercetin 173
Cattails 193
Essential Oils 193
Otto of Roses 193
Spices and Essential Oils as Preservatives 257
Mbocaya Palm 266
Seaweed Colloids 334